40 Log Canoe Circle, Stevensville, MD 21666

(410) 604-3400 | bardac.com | driveweb.com

APPLICATION NOTE

Drive Applications Support Library

Application Note	AN-P2-009
Title	**Programming the Drive User Relays**
Related Products	**P2 Series AC Drives**
Level: **1**	1 - Fundamental - No previous experience necessary. 2 - Basic - Some basic drives knowledge recommended. 3 - Advanced - Some basic drives knowledge required. 4 - Expert - Good experience in topic of subject matter recommended.

Overview:

P2 Series drives have two internal relays which can be programmed to open or close depending upon certain operating conditions within the drive. Other devices and controllers can then be integrated with the drive so that an action can be performed based upon the operating status of the drive.

This application note shows the parameter setting for the two relays and drive terminal connections.

Parameters:

P2-15 User Relay 1 Output Function Select

The condition under which output relay 1 closes is programmed using this parameter.

When the relay is activated the normally open contact (T15) closes to the common contact (T14) and the normally closed contact (T16) opens from the common contact (T14).

The following options can be selected:

P2-15	Function	Explanation
0	Drive Enabled	The relay contacts close when the drive enable signal is present and the drive has gone to an enabled state (i.e. no trip or fault present).

P2-15	Function	Explanation
1	Drive Healthy	The relay contacts close when the drive is powered up and no fault exists. If the power is removed, or the drive trips, the relay contacts will open.
2	At Target Frequency	The relay contacts close when the drive output frequency matches the requested set-point frequency.
3	Output Frequency > 0	The relay contacts close when the drive output frequency exceeds 0.0Hz. I.e. when the output is not at zero speed or disabled.
4	Output Frequency ≥ limit	The relay contacts close when the output frequency of the drive is greater than the limit programmed in P2-16 and reopens when the output frequency falls below the level programmed in P2-17.
5	Motor Current ≥ limit	The relay contacts close when the output current of the drive is greater than the limit programmed in P2-16 and reopens when the output current falls below the level programmed in P2-17.
6	Motor Torque ≥ limit	The relay contacts close when the output Torque of the motor is greater than the limit programmed in P2-16 and reopens when the output current falls below the level programmed in P2-17.
7	Analog Input 2 ≥ limit	The relay contacts close when the value of analog input 2 is greater than the limit programmed in P2-16 and reopens when the output current falls below the level programmed in P2-17.

P2-18 User Relay 2 Output Function Select

The condition under which output relay 2 closes is programmed using this parameter.

When the relay is activated the normally open contact (T18) closes to the common contact (T17).

The following options can be selected:

P2-18	Function	Explanation
0	Drive Enabled	The relay contacts close when the drive enable signal is present and the drive has gone to an enabled state (i.e. no trip or fault present).
1	Drive Healthy	The relay contacts close when the drive is powered up and no fault exists. If the power is removed, or the drive trips, the relay contacts will open.

P2-18	Function	Explanation
2	At Target Frequency	The relay contacts close when the drive output frequency matches the requested set-point frequency.
3	Output Frequency > 0	The relay contacts close when the drive output frequency exceeds 0.0Hz. I.e. when the output is not at zero speed or disabled.
4	Output Frequency ≥ limit	The relay contacts close when the output frequency of the drive is greater than the limit programmed in P2-19 and reopens when the output frequency falls below the level programmed in P2-20.
5	Motor Current ≥ limit	The relay contacts close when the output current of the drive is greater than the limit programmed in P2-19 and reopens when the output current falls below the level programmed in P2-20.
6	Motor Torque ≥ limit	The relay contacts close when the output Torque of the motor is greater than the limit programmed in P2-19 and reopens when the output current falls below the level programmed in P2-20.
7	Analog Input 2 ≥ limit	The relay contacts close when the value of analog input 2 is greater than the limit programmed in P2-19 and reopens when the output current falls below the level programmed in P2-20.
8	Hoist Brake Control	The relay can be used to control a motor holding brake on a hoist. Contact your local sales partner for more information on using this feature. Do not active before seeking further advice.

P2-16 Adjustable Threshold 1 Upper Limit (For Relay 1)

P2-17 Adjustable Threshold 1 Lower Limit (For Relay 1)

P2-18 Adjustable Threshold 2 Upper Limit (For Relay 2)

P2-19 Adjustable Threshold 2 Lower Limit (For Relay 2)

These parameters are used to define the closing and opening levels (limits) for relay 1 and relay 2 where the switching point is a variable or adjustable value. The parameters are active when P2-15 (User Relay 1 Output Function Select) or P2-18 (User Relay 2 Output Function Select) are set to a value between 4 and 7.

The adjustable threshold parameters are set as a percentage of the function selected in P2-15 / P2-18. The percentage values set relate to the following drive values:

| P2-15 P2-18	Function	P2-16 / P2-17 Settings P2-19 / P2-20 Settings
4	Output Frequency ≥ limit	P2-16 and P2-17 are set as a percentage of P1-01 (Motor Maximum Speed).
5	Motor Current ≥ limit	P2-16 and P2-17 are set as a percentage of P1-08 (Motor Rated Current).
6	Motor Torque ≥ limit	P2-16 and P2-17 are set as a percentage of the instantaneous output torque level produced by the motor (viewed in P0-12).
7	Analog Input 2 ≥ limit	P2-16 and P2-17 are set as a percentage of analog input 2 maximum value (viewed in P0-02).

Example:

If P2-15 is set to '4' (Output Frequency ≥ limit) then P2-16 and P2-17 are set as a percentage of P1-01 (Motor Maximum Speed).

Assuming P1-01 = 50Hz, P2-16 = 50.0%, P2-17 = 40%, then relay contacts will close when the output frequency is equal or above 25.0Hz, and reopens when the output frequency is less than 20.0 Hz.

Terminals Configuration:

The relay terminals on P2 Series drives are provided on a separate pluggable 5 way connector block. The terminal connections for the P2 are illustrated below:
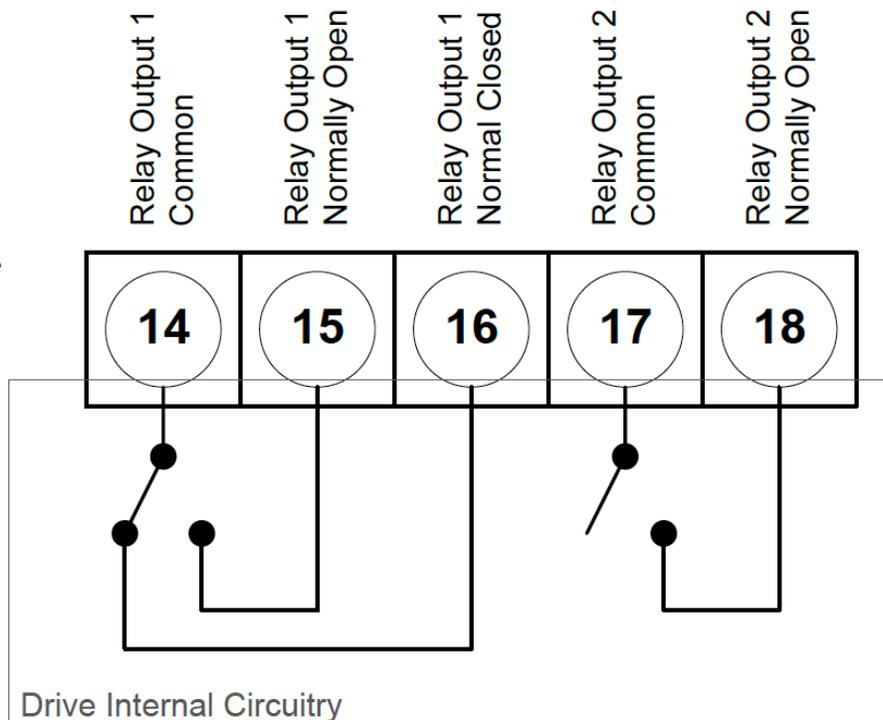
Note that when the drive is powered down, the contacts are always open.

Relay Specifications:

The relay terminals on P2 Series drives are provided on a separate pluggable 5 way connector block. The terminal connections for the P2 are illustrated below:

Terminal	Short Name	Long Name	Contact Rating
14	RL1-C	Relay Output 1 Common	Relay contacts, 250V AC, 30V DC, 5A
15	RL1-NO	Relay Output 1 NO	Relay contacts, 250V AC, 30V DC, 5A
16	RL1-NC	Relay Output 1 NC	Relay contacts, 250V AC, 30V DC, 5A
17	RL2-A	Relay Output 2 Common	Relay contacts, 250V AC, 30V DC, 5A
18	RL2-B	Relay Output 2 NO	Relay contacts, 250V AC, 30V DC, 5A

Appendix:

Revision History			
Version	**Comments**	**Author**	**Date**
1	Document Creation	JP	02/08/12
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